THE ARMY'S ROLE IN SPACE: SUPPORT FOR THE BATTLEFIELD COMMANDER

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"The role of the Army in space is already evident--it has no role." This was the sobering conclusion of B. Bruce-Briggs, writing in the December 1986 issue of *Military Review*.[1] In his somewhat satirical analysis of space as the new "high ground," Bruce-Briggs proposed that space is a type of high ground that the Army is not equipped to exploit, and therefore the Army should develop space applications only as a "junior partner" to the other services.

We emphatically disagree with this conclusion. We believe that the Army does have a role in space, and a role that serves its own necessity: the development of tactical applications *in any technological area that can potentially support the battlefield commander.*

In our view, space isn't just a place where tactical high ground is assumed and defended and used--it is a *technological arena* that is currently providing the genesis of new tactical devices and systems that the Army can ignore only at its peril. Thus we argue that the Army should not sit back and assume from the outset that a "junior partnership" in space will permit it to develop the Army-unique capabilities that space technologies may offer.

The divergence of our view and that of Bruce-Briggs may stem in part from different perceptions of how the Army plans to fight its next war. We assume implicitly that the Army now plans to fight according to the tenets of AirLand Battle: agility, initiative, depth, and synchronization. Such an Army does not shrink from seizing opportunities. Almost by definition, it is not an Army mired "in the mud," as Bruce-Briggs suggests.

Instead, the spirit of current and likely future AirLand Battle doctrine is an aggressive one that foresees and exploits ground opportunities wherever such opportunities may exist, and also

[1]"The Army in Space: New High Ground or Hot-Air Balloon?" pp. 44-49.

unabashedly exploits current and future technologies (including, yes, the "S" word--space) to help it carry out its ground missions.

Our thoughts on the Army's future role in space are based on the findings of an ongoing Arroyo Center[2] research project. For the past two years, this project has been assessing the Army's potential role in the military uses of space and investigating how these uses might support or enhance the Army's objectives. To do this, the project collected and analyzed over 100 potential applications of space systems to Army missions. It assisted the Army Space Initiatives Study (ASIS) and helped the Army Material Command (AMC) assess potential space technologies and their applications to the battlefield of the future, which we consider below.

THE FUTURE BATTLEFIELD

In the battlefield environment of the future, commanders will have access to space systems that can provide enhanced communications and synchronization, navigation and meteorological information, battlefield situation assessment, and early warning and tip-off/cuing capabilities. Command and control will also be enhanced through the development of space-based capabilities that will locate enemy force concentrations and dispositions (see Fig. 1).

One force that will dictate the shape of the battlefield of the future is the evolving threat posed by the main U.S. adversary. The Soviet Union is clearly developing space-based capabilities that could support its ground units. It has already developed a very robust satellite replenishment capability (typically the Soviet Union launches about ten times as many satellites as the United States) and a very responsive (a few hours') standby capability to launch satellites into orbits specifically designed to gather data for crisis situations.

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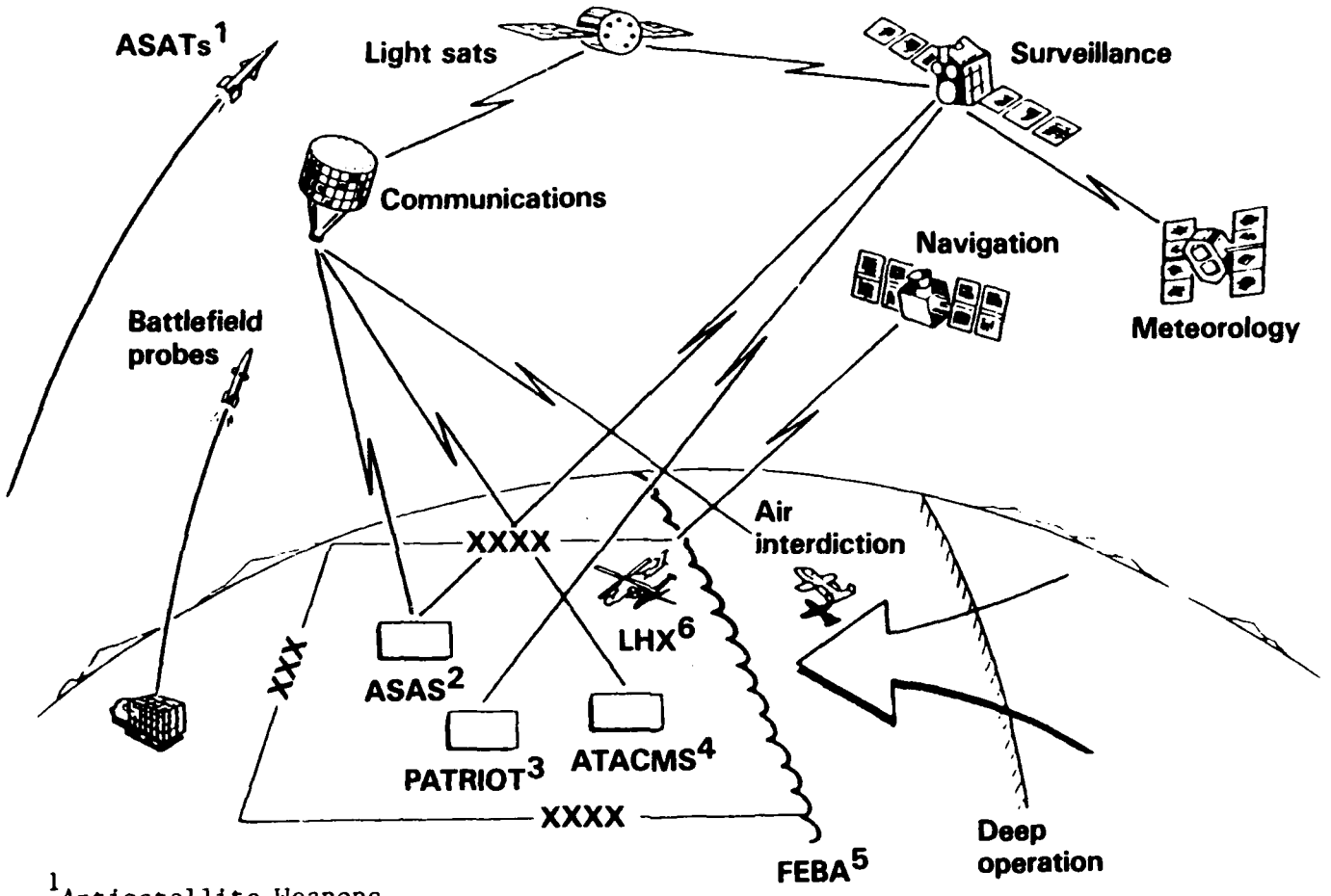
[2]The Arroyo Center is the Army's Federally Funded Research and Development Center for studies and analysis that is located at The RAND Corporation, a private, nonprofit research institution in Santa Monica, California. The Arroyo Center provides the Army with objective, independent analytic research on major policy and management concerns, with an emphasis on mid- to long-term problems. The views expressed in this article do not necessarily reflect those of the sponsor of the Arroyo Center project on whose findings it is based.



[1]Antisatellite Weapons

[2]All-Source Analysis System

[3]PATRIOT Missile System

[4]Army Tactical Missile System

[5]Forward Edge of Battle Area

[6]Light Helicopter Experimental

Fig. 1—Battlefield of the future

As a consequence, the Soviets have a highly redundant and robust space architecture. The United States, however, because of its dependence on the shuttle as a launch vehicle and in light of the recent *Challenger* disaster, is struggling to reestablish an expanded launch capability.

While one can argue that the U.S. satellite design philosophy that produced long orbit lifetimes has saved the day--i.e., that on-orbit satellites continue to operate and provide the United States with the national technical means for arms control verification data--there is a growing national concern that perhaps the United States should reexamine its satellite design and launch policies. The disparity between U.S. and Soviet Union antisatellite (ASAT) capabilities, coupled with the consequent vulnerability of U.S. low-altitude satellites, enhances the importance of this reassessment.

In addition to the above national motivation, there also appears to be a *technological opportunity*. At this juncture, it may be possible for the United States to apply its technological advantage in computers, sensors, materials, power systems, and microminiaturization to create cost-competitive, lightweight, short-lifetime satellites that could provide feasible options for short-term military and crisis management use. As a competitive strategy vis-a-vis the U.S.S.R., the concept of such "light sats" merits serious, sustained investigation.

Furthermore, we can envision an on-demand space launch mission that is operated by the Army to support a theater commander. This mission might support all services as well as complement national capabilities by providing backup and/or replacement satellite capabilities during contingencies, crises, and wartime. In wartime, launches would be requested directly by corps commanders. The U.S. Space Command (USSPACECOM) would control the launches, establish satellite constellations responsive to the battlefield commander's needs, and monitor the performance of the satellite.

An essential feature of this on-demand launch mission is for the data to be directly available to the corps commander through ground processors owned by the corps. The data could also be shared in

parallel with echelons above corps (EACs), theater, and national intelligence organizations.

While an on-demand satellite launch capability might be the ultimate Army role in space, much must be accomplished before the dimensions of that role are determined. This involves not only the organization and education of the Army to deal with space systems, but also the systematic analysis of the various elements of this vision--including trade-off analyses with nonspace options for accomplishing the same mission. Here we are in agreement with Bruce-Briggs.

With that in mind, let us briefly discuss some example "notional" systems concepts that may hold promise for serving battlefield commanders' needs.

POTENTIAL FUTURE SPACE SYSTEMS WITH BATTLEFIELD APPLICATIONS

- **The Battlefield Probe**

Because the future battlefield will extend to deeper distances, the commander will need the ability to "see deep" behind the forward line of own troops (FLOT). In the battlefield probe concept, a transporter-erector-launcher (TEL) launches a payload on a suborbital trajectory on the friendly side of the FLOT to "look" beyond the FLOT and provide real-time theater/battlefield status information.

One advantage that this offers over nonspace options such as unattended airborne vehicles (UAVs) and high-altitude reconnaissance aircraft is that, because of the suborbital height attained, the probe does not have to penetrate enemy territory. Another advantage is that the TEL would be Army controlled and would permit launch on demand. A light-sat approach for procuring the flight hardware could result in a cost-effective system procurable in fairly large numbers. However, comparison of this type of system with other nonspace alternatives must still be resolved.

- **The "Space Tip-off" Concept**

Space tip-off means that space assets are used to forewarn ground commanders against such threats as incoming Tactical Ballistic Missiles (TBMs), potentially allowing some time to take appropriate survival measures. Such a system would provide useful information for passive defense, terminal defense, and possibly counterfire responses. It could also cue ground-based radars to backtrack and target the TBM launchers.

- **Monitoring Ground Transportation Assets**

The monitoring of ground transportation assets is an example of a space system that could revolutionize Army combat service support. Such a system could be used to stay in contact with such key friendly units as convoy vehicles, ambulances, and maintenance teams, as well as with such high-value combat units as Army Tactical Missile Systems (ATACMs). For example, the Global Positioning System (GPS) provides positioning data via man-portable and vehicle terminals. Augmenting the GPS with a "report-back" communications capability could provide the Army with the desired ground-monitoring potential.

- **Satellite Weather Reports**

The availability of near-real-time satellite weather displays for the battlefield commander could substantially increase the effective use of U.S. forces. An enhanced capability providing tactical decision aids for the commander on the effects of weather and terrain using space systems could identify preferred penetration corridors and help define enemy movement potentials and effective use of smart weapons.

ANALYZING THE EFFECTIVE USE OF SPACE

The notional concepts mentioned above represent only a small sample of the potential uses for space systems that could support a wide menu of Army purposes, from tactical to logistical functions. In fact, many of the things AirLand Battle envisions--attacking the enemy in depth, maneuvering deep, holding back, and then committing reserves in a decisive manner--all require new technological capabilities that, at the moment, only space systems seem flexible, independent, and all-pervasive enough to provide.

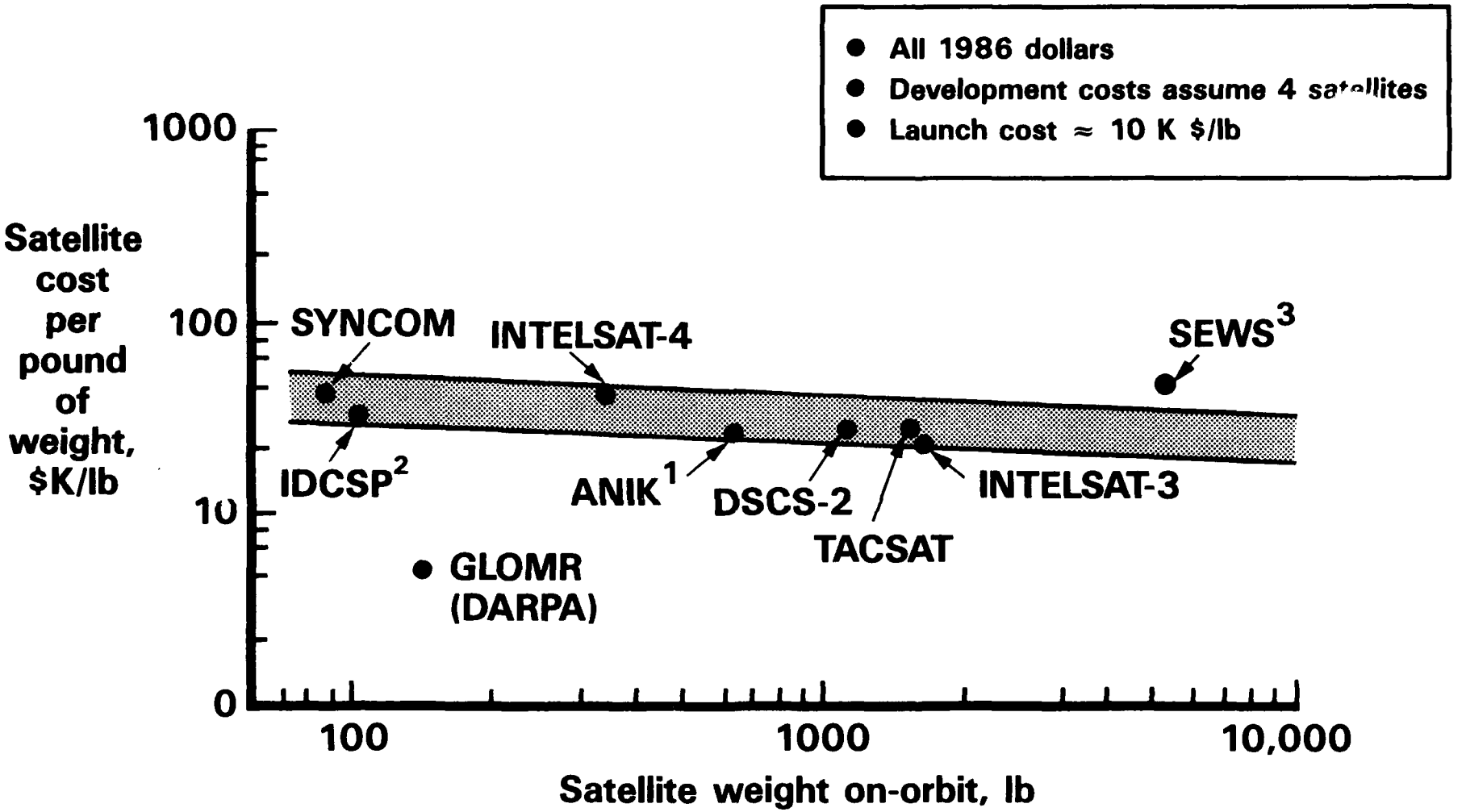
However, while we are bullish about the Army's future use of space systems, we recognize that the costs of such systems will also be a key issue. Cost-effectiveness studies may establish that space is not the optimal solution for every case.

Three key analytical exercises should frame the consideration of each future space system: (1) considering whether the affordability issue can be adequately addressed through the use of light sats that employ off-the-shelf hardware; (2) analyzing whether the system will, in fact, effectively serve and support the battlefield commander; and (3) performing a trade-off analysis versus nonspace alternatives.

Figure 2 offers a sample of one of the cost relationship studies we have already performed. It shows the weights of different satellite systems and highlights their relative costs in thousands of dollars per pound of weight. Illustrated is the difference in the cost of satellites produced by the traditional approach (the highlighted band) and DARPA's Global Orbital Message Relay (GLOMR) store-and-forward communications satellite, which emphasizes a light-sat approach. Such cost analyses must, we believe, form an integral part of Army space planning.

CONCLUSIONS

In the final analysis, we suspect that AirLand Battle may not be possible in the long term without its becoming AeroSpace Land Battle. Just as the Air Force, as Bruce-Briggs notes, had to adopt the concept of "aerospace" to escape the limiting confines of its "air" missions, so



[1]ANIK — Canadian National Communications Satellite
[2]IDCSP — Initial Defense Communication Satellite Program
[3]SEWS — Satellite Early Warning System

Fig. 2—Satellite cost relationships

may the Army have to adopt an "aerospace" concept simply to make AirLand feasible under the new technological conditions, costs, and opportunities likely to obtain in the future.

Thus, we believe in a doctrinal role for the Army in space. To fight in the manner it wants to fight, given the likely future battlefield, the Army may be driven to develop an "aerospace" doctrine in the future--especially since the army of the Soviet Union may already have such a concept.

We believe AeroSpace Land Battle is a concept that continues to reflect the aggressive, opportunistic spirit of AirLand Battle, yet also would give our future Army the flexibility and agility it will need to fight, survive, and prevail on the ground--even in the mud.